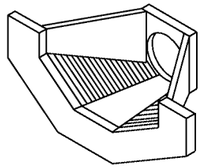
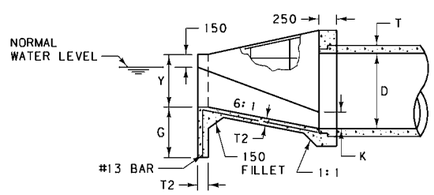


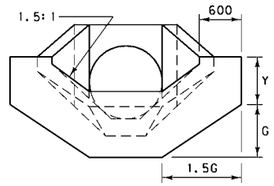
ISOMETRIC VIEW OF TRANSITION

PLACE REBAR IN CENTER OF WALLS, SLAB, ETC. UNLESS OTHERWISE SPECIFIED.

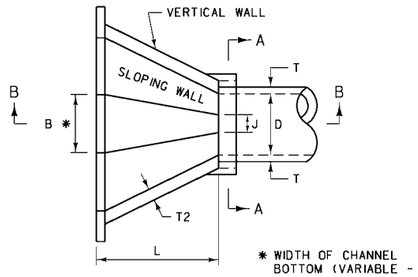


SECTION B-B

SPACE REINFORCING BARS APPROX. 300 mm EACH WAY THROUGHOUT STRUCTURE. USE CONTINUOUS BARS IN FLOORS AND WALLS WHENEVER POSSIBLE. WHEN SPLICES ARE MADE, LAP REINFORCING BAR 450 mm.

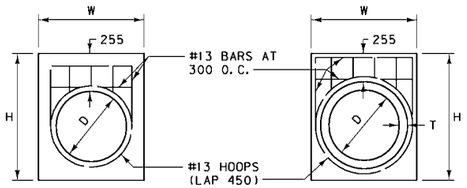


ELEVATION



* WIDTH OF CHANNEL BOTTOM (VARIABLE - SEE TABLE)

PLAN VIEW



SECTION A-A
FOR CSP

SECTION A-A
FOR RCP

CHAMFER ALL EXPOSED CORNERS TO 25 mm.

INLET AND OUTLET CONCRETE TRANSITIONS FOR CSP

CULVERT		DIMENSIONS								QUANTITIES								
										B = D			B = D + 300			B = D + 600		
DIA. D	AREA (m^2)	J	H	L	T2	W	K	Y	G	B	CL "DD" CONC. (m^3)	#13 REBAR (kg)	B	CL "DD" CONC. (m^3)	#13 REBAR (kg)	B	CL "DD" CONC. (m^3)	#13 REBAR (kg)
450	0.159	140	1050	900	150	850	105	380	600	450	0.6	31.3	750	0.7	33.6	1050	0.7	36.3
600	0.283	180	1250	1200	150	1000	140	460	600	600	0.9	43.5	900	1.0	46.3	1200	1.0	49.0
750	0.442	240	1400	1500	150	1100	180	530	600	750	1.2	55.3	1050	1.2	58.5	1350	1.3	61.7
900	0.636	275	1550	1800	150	1300	210	610	750	900	1.6	75.8	1200	1.7	78.9	1500	1.7	83.5
1050	0.866	310	1750	2100	150	1500	240	690	750	1050	2.0	90.7	1350	2.1	95.7	1650	2.2	100.2
1200	1.131	365	1900	2400	200	1600	280	760	750	1200	3.1	116.6	1500	3.2	121.1	1800	3.4	125.2

INLET AND OUTLET CONCRETE TRANSITIONS FOR RCP

CULVERT		DIMENSIONS									QUANTITIES								
											B = D			B = D + 300			B = D + 600		
DIA. D	AREA (m^2)	J	H	L	T	T2	W	K	Y	G	B	CL "DD" CONC. (m^3)	#13 REBAR (kg)	B	CL "DD" CONC. (m^3)	#13 REBAR (kg)	B	CL "DD" CONC. (m^3)	#13 REBAR (kg)
450	0.164	140	1100	900	63.5	150	970	105	380	600	450	0.6	33.6	750	0.7	36.3	1050	0.8	38.6
600	0.292	185	1300	1200	76.2	150	1150	140	460	600	600	0.9	45.4	900	1.0	48.1	1200	1.0	50.8
750	0.456	230	1500	1500	88.9	150	1320	175	530	600	750	1.2	57.6	1050	1.3	60.8	1350	1.4	64.0
900	0.657	275	1700	1800	101.6	150	1500	215	610	750	900	1.6	78.9	1200	1.7	82.1	1500	1.8	86.6
1050	0.894	325	1900	2100	114.3	150	1680	245	690	750	1050	2.1	96.2	1350	2.1	100.7	1650	2.2	105.2
1200	1.167	370	2050	2400	127.0	200	1860	280	760	750	1200	3.1	121.1	1500	3.3	125.6	1800	3.4	130.2

NOTES:

INSTALL STRUCTURES OUTSIDE THE CLEAR ZONE.

PROVIDE TRASHRACKS WHEN REQUIRED. SEE DTL. DWG. NO. 615-02.

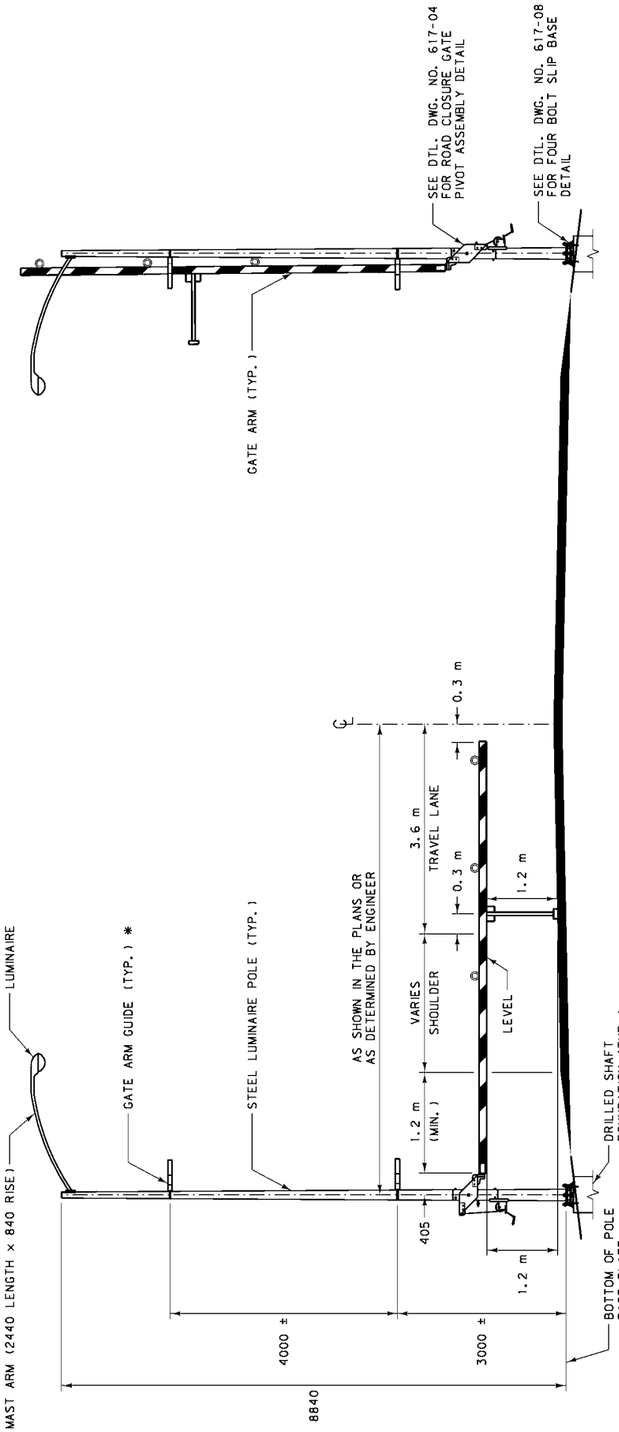
ALL DIMENSIONS ARE MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

DETAILED DRAWING
REFERENCE STANDARD SPEC. SECTION 615
DWG. NO. 615-06

CONCRETE IRRIGATION INLET AND OUTLET TRANSITION FOR RCP AND CSP PIPES

EFFECTIVE: AUGUST 1999

MONTANA DEPARTMENT OF TRANSPORTATION — MONTANA CADD



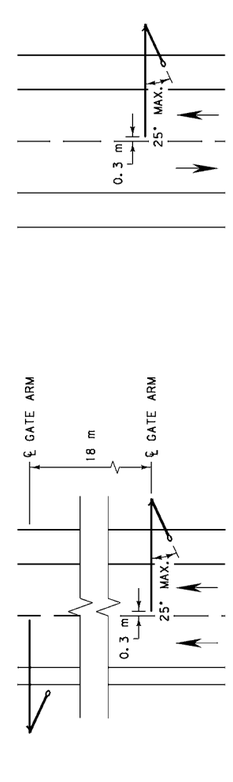
ALL DIMENSIONS ARE MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

NOTES:

* HEIGHT OF GATE ARM GUIDES MAY VARY AS REQUIRED FOR WARNING LIGHT CLEARANCES.

SEE DTL. DWG. NO. 617-02 FOR ADDITIONAL ROAD CLOSURE GATE DETAILS.

ELEVATION
DIVIDED HIGHWAY INSTALLATION SHOWN



TYPICAL TWO-WAY, TWO-LANE INSTALLATION
(1 GATE REQUIRED)

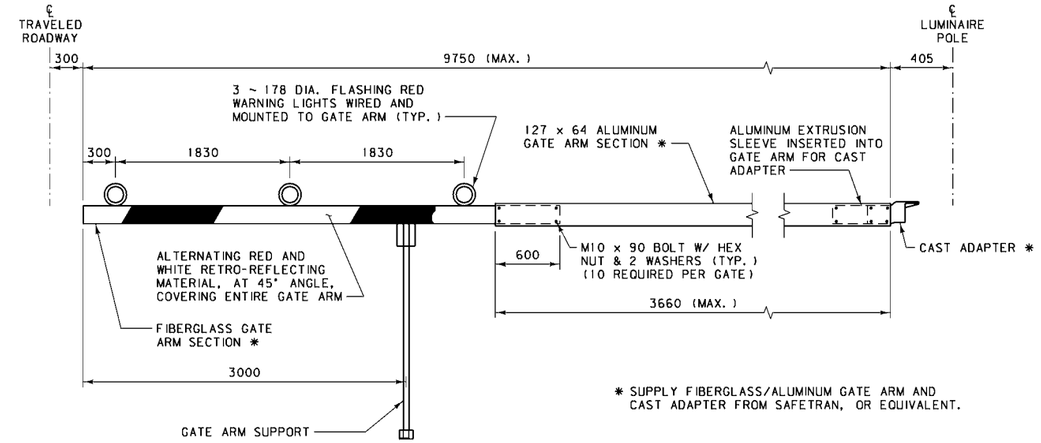
TYPICAL DIVIDED HIGHWAY INSTALLATION
(2 GATES REQUIRED)

DETAILED DRAWING
REFERENCE STANDARD SPEC. SECTION 617
DWG. NO. 617-00

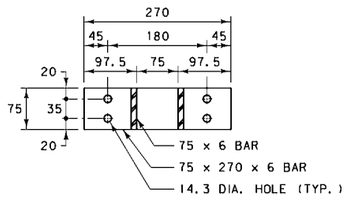
ROAD CLOSURE GATE

EFFECTIVE: AUGUST 1999

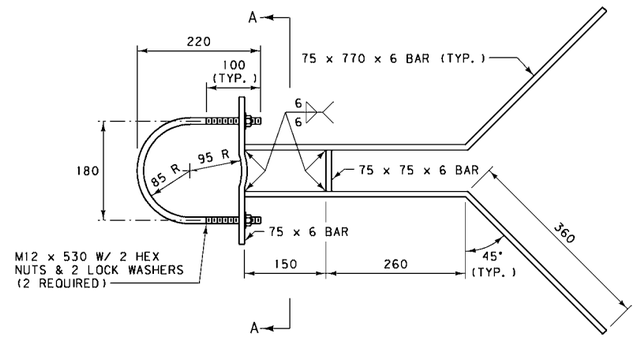
MONTANA DEPARTMENT OF TRANSPORTATION — MONTANA CADD



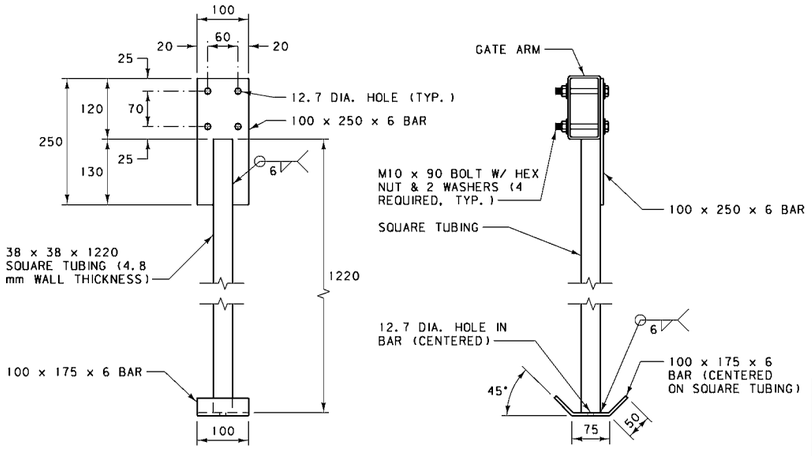
GATE ARM



SECTION A-A
(U-BOLTS NOT SHOWN)



GATE ARM GUIDE



ELEVATION
(GATE ARM AND BOLTS NOT SHOWN)

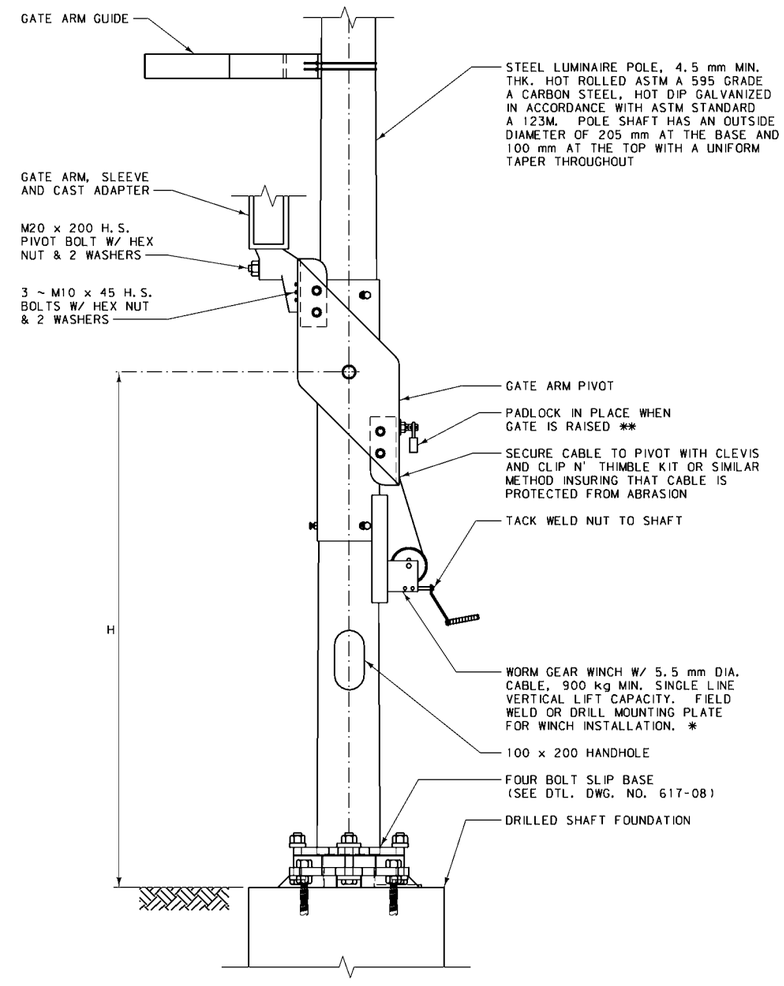
RIGHT SIDE

GATE ARM SUPPORT

ALL DIMENSIONS ARE MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

DETAILED DRAWING	
REFERENCE STANDARD SPEC. SECTION 617	DWG. NO. 617-02
ROAD CLOSURE GATE DETAILS	
EFFECTIVE: AUGUST 1999	

MONTANA DEPARTMENT OF TRANSPORTATION — MONTANA CADD



ROAD CLOSURE GATE
PIVOT ASSEMBLY

NOTES:

SEE DTL. DWG. NO. 617-06 FOR PIVOT ASSEMBLY DETAILS.

MOUNTING HEIGHT (H) WILL BE SHOWN IN THE PLANS OR SPECIFIED BY THE ENGINEER TO PROVIDE FOR THE PROPER HEIGHT OF THE GATE ABOVE THE ROADWAY.

ALL BOLTS ARE TO CONFORM TO ASTM F 568M CLASS 4.6, UNLESS DESIGNATED H.S. (HIGH STRENGTH), WHICH ARE TO CONFORM TO ASTM A 325M. AFTER ROAD CLOSURE GATE ASSEMBLY, PAINT ALL EXPOSED BOLT THREADS OR DAMAGE TO THE GALVANIZING WITH TWO COATS OF ZINC RICH PAINT CONFORMING TO ASTM A 780.

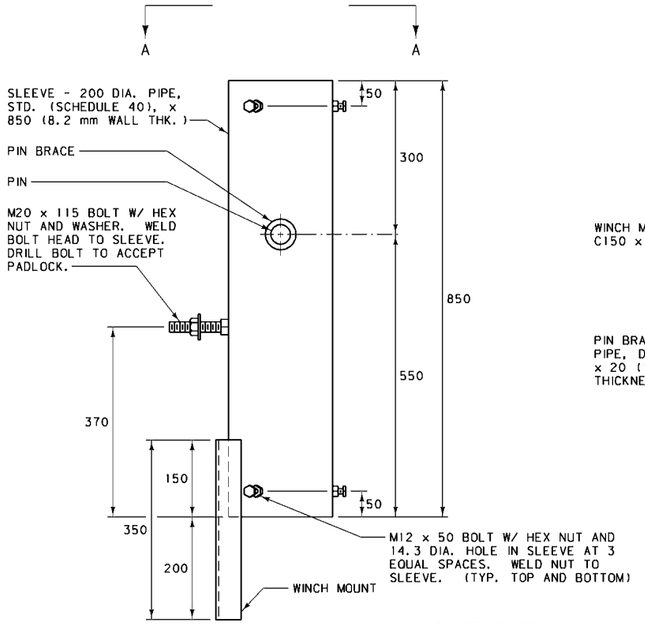
* SUPPLY WORM GEAR WINCH AND CABLE FROM DUTTON - LAINSON (STOCK NUMBER 4Z183), OR EQUIVALENT.

** WHEN THE GATE IS FULLY RAISED, PLACE THE NUT AND WASHER SNUGLY AGAINST THE OUTSIDE OF THE REAR CHANNEL AND PADLOCK IN PLACE. SUPPLY ONE HEAVY, WEATHERPROOF PADLOCK WITH 2 KEYS FOR EACH GATE ARM PIVOT. KEY PAIRED PIVOTS (DIVIDED HIGHWAY INSTALLATION) ALIKE.

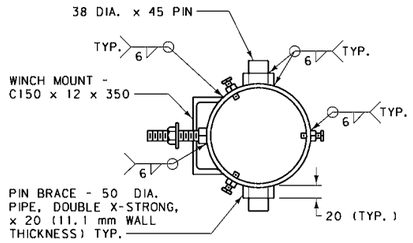
ALL DIMENSIONS ARE MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

DETAILED DRAWING	
REFERENCE STANDARD SPEC. SECTION 617	DWG. NO. 617-04
ROAD CLOSURE GATE PIVOT ASSEMBLY	
EFFECTIVE: AUGUST 1999	

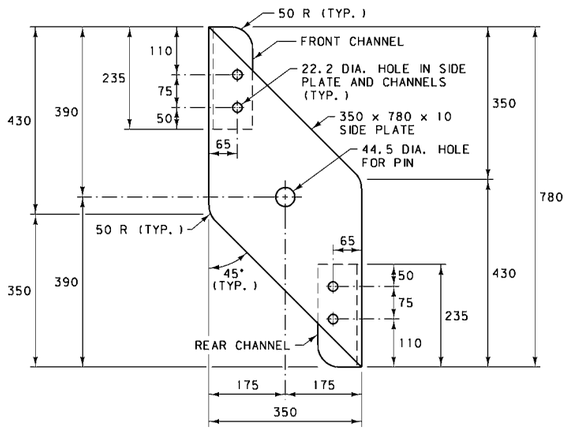
MONTANA DEPARTMENT OF TRANSPORTATION — MONTANA CADD



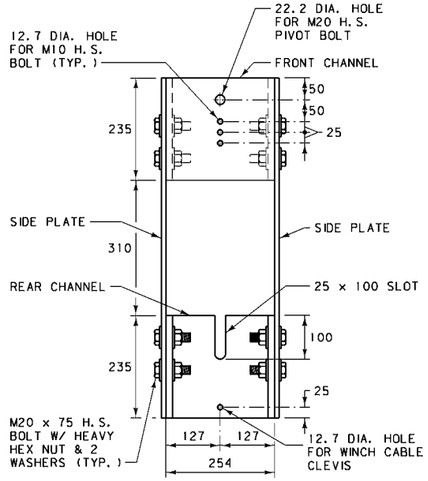
PIVOT SLEEVE



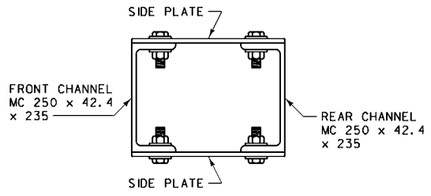
VIEW A-A



ELEVATION



END VIEW



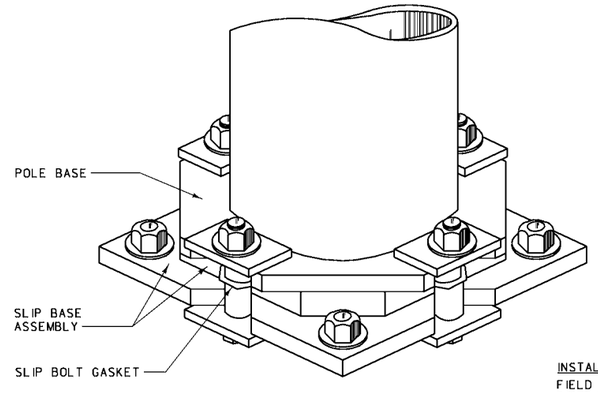
PLAN

SIDE PLATE

ALL DIMENSIONS ARE MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

DETAILED DRAWING	
REFERENCE STANDARD SPEC. SECTION 617	DWG. NO. 617-06
ROAD CLOSURE GATE PIVOT ASSEMBLY DETAILS	
EFFECTIVE: AUGUST 1999	

MONTANA DEPARTMENT OF TRANSPORTATION — MONTANA CADD



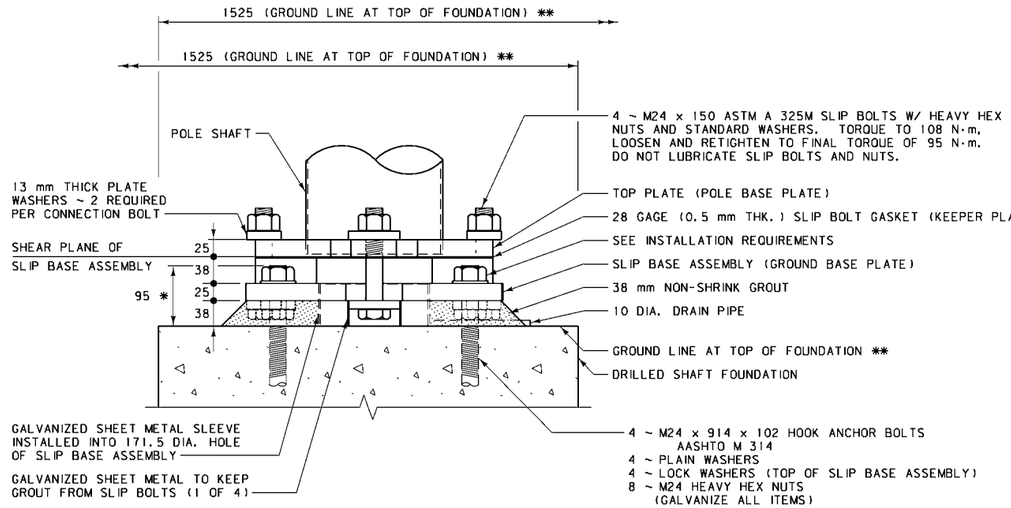
ISOMETRIC VIEW

* TOP OF ANCHOR BOLTS MUST BE BELOW SHEAR PLANE.

** IT IS CRITICAL THAT THE GROUND SURROUNDING THE CONCRETE FOUNDATION BE GRADED AND CONTOURED TO PREVENT VEHICLE UNDERCARRIAGE SNAGGING. ALL POINTS ON THE GROUND SURFACE ARE TO BE AT THE TOP OF THE FOUNDATION WITHIN ANY 1525 mm HORIZONTAL DISTANCE EXTENDING OVER THE SLIP BASE AS SHOWN, AND ALIGNING PERPENDICULAR TO THE ROADWAY CENTERLINE OR ON A RADIAL LINE FOR A CURVED ROADWAY.

INSTALLATION REQUIREMENTS FOR TOP NUTS OF ANCHOR BOLTS

FIELD LUBRICATE BEARING FACE AND THREADS OF TOP ANCHOR BOLT NUTS WITH A STICK WAX. TIGHTEN TOP NUTS TO SNUG-TIGHT. SNUG-TIGHT IS DEFINED AS THE TIGHTNESS THAT EXISTS WHEN THE GROUND BASE PLATE IS IN FIRM CONTACT WITH THE TOP AND BOTTOM NUTS, AND IS ATTAINED BY THE FULL EFFORT OF A MAN USING AN ORDINARY SPUD WRENCH. AFTER THE SNUG-TIGHT CONDITION IS ATTAINED, ROTATE THE TOP NUTS AN ADDITIONAL 45° (+20°, -0°).



FOUR BOLT SLIP BASE

NOTES:

SEE DTL. DWG. NO. 617-10 FOR FOUR BOLT SLIP BASE DETAILS AND DRILLED SHAFT FOUNDATION.

CONFORM SLIP BOLT GASKET (KEEPER PLATE) TO ASTM A 653M GRADE 230 WITH COATING ASTM G 90.

CONFORM ALL PLATES TO ASTM A 709M (GRADE 250) OR AASHTO M 270M.

GALVANIZE ALL STRUCTURAL STEEL AFTER FABRICATION ACCORDING TO ASTM A 123M. ALL CONTACT AREAS OF STRUCTURAL STEEL ARE TO BE FREE OF GALVANIZING BEADS AND RUNS.

ELECTRO-PLATE ALL CONNECTING HARDWARE (HIGH STRENGTH BOLTS, HEAVY HEX NUTS AND STD. WASHERS) WITH CADMIUM IN ACCORDANCE WITH ASTM B 766 CLASS 12.

DO NOT ENCLOSE ANY SLIP BOLT HEADS OR WASHERS IN GROUT AND KEEP THEM COMPLETELY MECHANICALLY ACCESSIBLE, ALLOWING BOLTS TO BE FREELY PUSHED OUT DURING VEHICLE IMPACT.

ALL DIMENSIONS ARE MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

DETAILED DRAWING	
REFERENCE STANDARD SPEC. SECTION 617	DWG. NO. 617-08
FOUR BOLT SLIP BASE	
EFFECTIVE: AUGUST 1999	

MONTANA DEPARTMENT OF TRANSPORTATION — MONTANA CADD

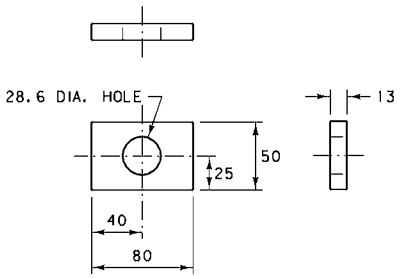
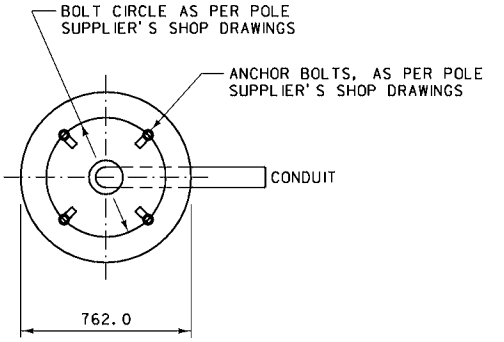
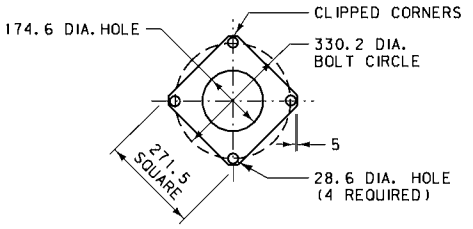
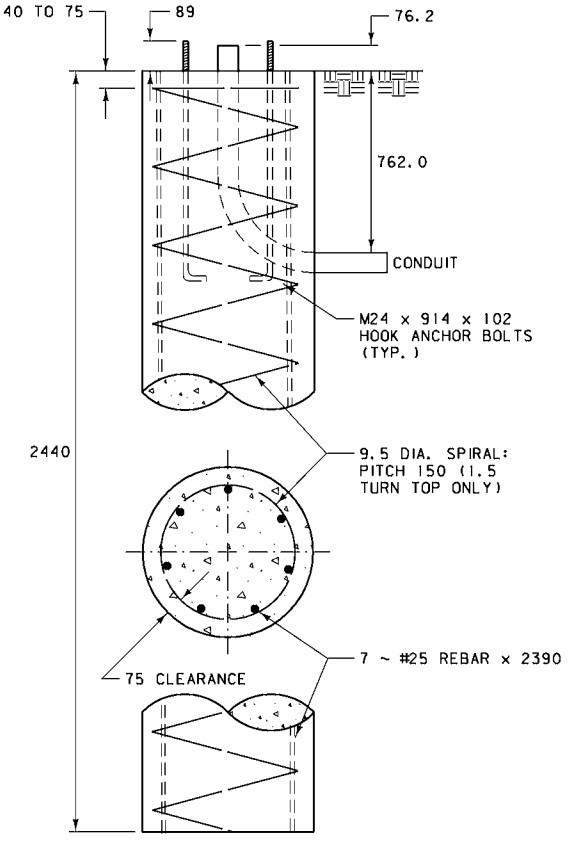


PLATE WASHER

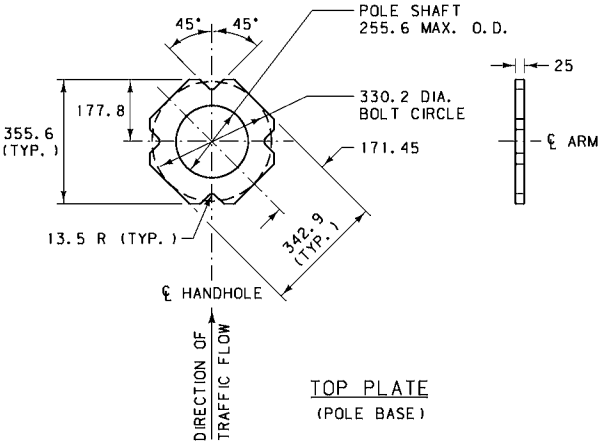




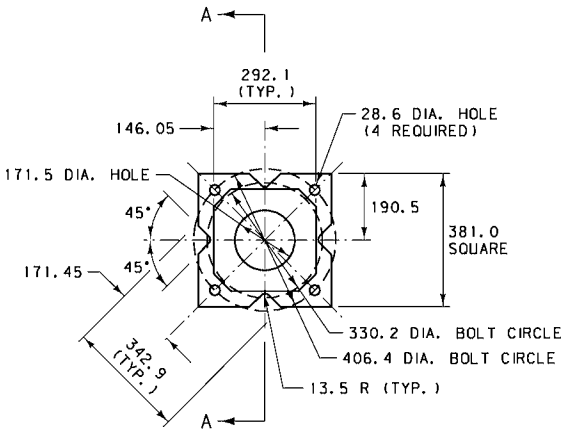
SLIP BOLT GASKET
(KEEPER PLATE)



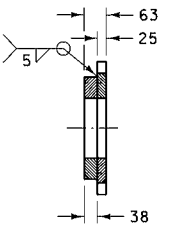
DRILLED SHAFT FOUNDATION
(LUMINAIRE POLE)



TOP PLATE
(POLE BASE)



SLIP BASE ASSEMBLY
(GROUND BASE PLATE)



SECTION A-A

ALL DIMENSIONS ARE MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

DETAILED DRAWING	
REFERENCE STANDARD SPEC. SECTION 617	DWG. NO. 617-10
FOUR BOLT SLIP BASE DETAILS	
EFFECTIVE: AUGUST 1999	

MONTANA DEPARTMENT OF TRANSPORTATION — MONTANA CADD